Gas Journal

VOL 299 | 111th YEAR | LONDON, SEPTEMBER 2, 1959 | No 5009 | PRICE 1/6

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Gas Journal

VOL. 299 No. 5009 September 2, 1959

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PUBLISHERS' NOTICE, See Page 360, May 27, 1959

There is more in gas metering than meets the eye

This is a case jointing clip for a Zephyr meter.

It is made from extruded aluminium of heavy section coated with epikote resin as an additional protection against corrosion. Four of these clips hold in compression the gasket which seals the case joint and prevents passage of gas between the case and the valveplate.

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1959

Gas Journal

VOLUME 299 No. 5009 SEPTEMBER 2, 1959 111th YEAR

Near-Automation at Murton

MOST industries today are exploiting some aspect of automation, however simple the application may be. As yet it has not been found possible to apply it to any great extent in the carbonising industries, though significant examples of its application to the gas industry will be found at the modern gas-from-oil plants supplying gas to the metropolitan area on either bank of the Thames.

In the coking industry, however, great advances have been made recently in centralised plant control and an outstanding example of its application is to be found at the National Coal Board's new coking plant at Murton in County Durham.

In the description of this plant, which we are publishing this week, we have tried to stress the great success achieved by the Durham Division of the N.C.B. and the contractor, the Woodall-Duckham Construction Co. Ltd., in applying what might be termed 'near-automation' to a coking and by-product plant. Mimic diagrams have become familiar to most gas engineers since the war, as has the sequence starting of conveyor belts. The station engineer is becoming 'remote control' minded and although the operation of flygates from a distance is at least familiar to him, the complete control of some section of the plant from a single point is something which has not hitherto been developed.

At Murton, the coal handling plant, that is to say, the conveying of washed slacks from the adjoining colliery's washery, their treatment and subsequent journey to the coke oven storage bunker, are in fact, controlled from a desk in a dust free room underneath the coal blending bunkers.

The working of the coke grading plant with its control point located above railwagon level in a kind of modern signal box, is a fascinating example of what can be done in controlling the working of belt conveyors, coke crushers and screens, the positioning of loading booms, and even the marshalling of railway wagons from a central operating point; in fact very great ingenuity has been shown in applying all available mechanical means to reduce as far as possible the need to employ unskilled labour in the movement of coal or coke. At this particular plant, the only stage in the coke's journey from the oven to the wagon, which relies on an operation by hand, is the opening and the closing of the finger gates on the quenched coke bench.

The driving position of the pusher has been designed so that the operator sits down and by manipulating controls within easy reach, he can literally carry out all operations connected with the discharging or preparation for recharging, of an oven from an arm-chair. The working of the by-product plant is controlled from a central panel placed in a slightly pressurised room in the 'by-product' house. Information from different sections of the plant comes by telemetering equipment to the central panel and is compared with values preset on the instruments. Any deviations are immediately corrected. Included on the panel is a section providing data for budgetary control.

These are the high-lights of a modern but otherwise perfectly orthodox coking plant, and we think it is symptomatic of the times that no expense in money or ingenuity should have been spared in providing these means of centralised control. Today, two of the most costly factors in coke or gas making are heat production and labour, and to be able to exploit means of avoiding excessive loss of one and excessive use of the other, large enough manufacturing units must be employed to justify the necessary equipment.

In the coking industry the effect of heat recovery by a more efficient regenerator system or its conservation by better general insulation of the battery is that more surplus gas becomes available for disposal to the local gas board. At Murton this amounts to about 7.5 mill. cu.ft. per day. Provision has been made, however, to extend the plant at some future date and additional ovens may be built as a continuation of the present batteries beyond the coal service bunker, which would avoid the construction of a second bunker. Gas producer plant may be built later for underfiring the batteries by lean gas which would release more coke oven gas. This would greatly add to the plant's flexibility as a source of town gas but the provision of cheap producer gas is a first essential.

Centralised control has brought obvious advantages and the N.C.B. estimates that it has been able to reduce

the number of men employed by some 10%. The type of man recruited is likely to be of a very much higher technical standard than was formerly necessary, especially among those needed for operating the control centres. This applies particularly to the by-product control panel where the operators must become instrument-minded and be able to consolidate the working of the plant as a whole as indicated by the instrument readings. This means a high average intelligence and adequate training.

The conception of the Murton plant is another step forward by the Durham Division of the N.C.B. in consolidating its coking plants. It is the fourth major plant of its kind to be completed in the division since the nationalisation of the coal industry and together with recent developments in colliery integration, forms part of the board's policy of concentrating production in bigger units. The new shaft for skip winding, sunk on an adjacent site to the coking plant, allows coal to be brought to the surface from three older pits and be cleaned in a well-equipped modern washery within belt conveyor distance of the coke oven blending bunkers. Thus at least two qualities of coal can be blended at minimum handling costs to produce a satisfactory coke, while a separate compartment of 700 tons capacity, in the service bunker allows experiments to be carried out on other blends.

The plant as a whole, we thought, was impressive. The layout seemed almost prodigal in its spaciousness and tended to detract somewhat from the obvious size of the coke oven batteries themselves. The design of the buildings is modern, and follows the current trend in the use of materials which considerably lightens appearances and by using bright, cheerful colours for internal decoration, the designer has contrived to dispel the traditional greyness and austerity of such plants. The dust extractors at the coke screens make for much cleaner surroundings and better working conditions.

One Hundred Years of Oil

LAST week the oil industry officially celebrated its hundredth birthday, for it was on August 27, 1859, that 'Colonel' Drake struck oil in Pennsylvania at 69½ ft.

Although oil had been known and used in small quantities for centuries before this and had been obtained in the United States from wells drilled for salt, this was the first time that a well had been successfully drilled specifically for oil. The rising demand for illuminating oil, up till then largely whale oil, had encouraged business men in the United States to consider drilling for oil as they were doing already for salt, and the Petroleum Rock Oil Company had been formed for this purpose. Its shareholders had, however, objected to the new fangled idea, so it was dissolved and its leases at Titusville, North Western Pennsylvannia, were taken over by the Seneca Oil Company, which engaged an ex-railroad conductor, Edwin L. Drake, to drill a well in the forest near Oil Creek. Drake had arrived on the scene in the spring of 1858 and it had taken him a year to get his equipment together. In 1859 he hired an old brine driller, 'Uncle' Bill Smith, to assist him. The company, however, became impatient and considered that the drilling had gone on too long and too much money had been spent on the enterprise. It therefore sent a message to Drake, telling him to discontinue drilling, but before the message was delivered oil had been found.

Drake's achievement had been to discover mineral oil —and in quantity, a short time before James Young in Scotland had discovered that an oily substance could be obtained from cannel coals and shales by distillation. But Drake's mineral oil was far easier to process and convert into usable products, so the Americans took the lead in developing their discovery.

In the early days oil was only used as a source of kerosene and lubricants. The assistance which the gas in the oil well could give in the discharge of the oil was imperfectly understood, so it was originally the practice to degas the oil as quickly as possible. The light gasoline distillation fraction was an embarrassment and often caused explosions so it, too, had to be disposed of. The oil industry, therefore, could not really fully develop until the discovery of the internal combustion engine in the 1880's, but nevertheless it was the illuminating oil trade that built up the large international oil companies that are household names today. Among the pioneers of oil as big business, Shell, a small East End of London company importing from the Far East, and Marcus Samuel, later Lord Bearstead, began to build up, in the 1880's, the export of Russian kerosene to Far Eastern markets. After obtaining a concession from their suppliers, Rothschilds, on condition that they sold only East of Suez, decided to ship their oil in bulk, and for some time were the only company allowed to ship its oil through the Suez Canal.

Later Samuel acquired oil-producing interests in Borneo, which he developed side by side with the Royal Dutch Petroleum Company, formed in 1890. Due to the price cutting activities of the Standard Oil Company among other reasons, the two companies combined their marketing activities and with Rothschilds formed the Asiatic Petroleum Co. Ltd., in 1920. Five years later they amalgamated completely to form one of the most spectacular mergers of the time. Samuel had always been a strong advocate of oil as a fuel and read a paper before the Royal Society of Arts in 1899 urging the adoption of oil burning by the British Navy. That was not to come, however, before the Middle East oil fields had been developed by the initiative of W. K. D'Arcy and the building of the Super-Dreadnought battleships in 1911.

Today the oil industry has become something more than a trading concern. The search for oil all over the world by the big international companies and the vast sums needed to prove and later exploit the newly discovered oil fields, gives the industry a world-wide outlook.

Personal

MR. JOHN WILSON, General Manager of the North Western Gas Board's biggest operating Group, the Manchester Group, is to retire shortly for health reasons. He will be succeeded by MR. A. H. NICHOLSON, General Manager of the East Lancashire Group. The Manchester Group, though its key works at Partington and Bradford Road, is the hub of the Board's grid system which interconnects the great industrial belt stretching between and beyond Manchester and Liverpool. It serves more consumers than any other of the Board's ten Groups and accounts for about one-quarter of all gas supplied in the North West. Mr. Wilson, who was born in Halifax, began his career as a technical assistant with the Halifax Gas Department. He was general manager of the United Kingdom Gas Corporation's North Cheshire group at Hyde from 1945 until nationalisation when he was appointed general manager of the Board's Manchester Group. Mr. Nicholson's career in the gas industry started in Stockton-on-Tees Corporation's Gas Department. On the nationalisation of the industry, when he was already engineer and manager of the Colne Corporation's Gas Department, he was selected as general manager of the old Blackburn Group and subsequently general manager of the newly-formed East Lancashire Group. A former president of Colne Rotary Club, Mr. Nicholson is Chairman for the current year of the Manchester and District Section of the Institution of Gas Engineers.

MR. A. L. HIGHAM, of The Elms, Sutton, has retired from the general managership of the Hull Group, North Eastern Gas Board, after 41 years' service in the gas industry. At a ceremony at Bankside gasworks, employees of the Hull group presented him with gifts of a Spanish mahogany antique bureau and a power-tool outfit, as an expression of their good wishes for a long and happy retirement. Mr. Higham comes from a family with a long association with the gas industry, his grandfather having worked at Hull gasworks and his father being a former engineer and manager to the Brough Gas Company.

MR. A. COLE, who has been engineer and deputy group manager at Hull for the past four years, and was formerly at Cleckheaton, near Bradford, has been appointed Group General Manager at Hull.

MR. G. A. VERNON and MR. J. K. FISHER have been appointed Sales Director and Works Director respectively of William Sugg & Co. Ltd.

MR. E. J. DUCKER, Area Manager (Southern), of Parkinson Cowan Appliances, Ltd., has, in addition, been appointed Area Manager (South Eastern). He succeeds MR. T. C. WEBSTER, who has been with the company since 1933 and who is now leaving to go into business on his own behalf.

At the recent Parkinson Cowan Appliances sales conference at Stechford Mr. T. C. Whimster was presented with a silver cigarette box and writing set by Mr. J. L. Anstey, Sales Director, on behalf of the Board and sales staff of P.C.A. Mr. Whimster—who had been with the company since 1933 and their South Eastern area manager since 1947—was leaving to set up in business on his own behalf. In the photograph Mr. Anstey (right) is seen presenting the writing set to Mr. Whimster in the presence of his former colleagues.

Obituary

COLONEL W. R. GLOVER

COLONEL W. R. GLOVER, C.M.G., D.S.O., T.D., has died at the age of 77. Honorary president of Glover & Main Ltd., Colonel Glover retired as chairman of the company in February this year. His death marks the end of 60 years' continuous service with the gas industry, a length of service which has seldom been equalled in the industry. A grandson of the founder of the company which bears the name, he joined Thomas Glover & Co. Ltd., in 1900 as an apprentice under his uncle, the late Mr. J. G. Glover. On completion of his apprenticeship in 1905 he became manager of the company's Birmingham branch and was appointed a director in 1910. In 1919, following distinguished service with the Royal Fusiliers in the 1914-18 war, he was appointed managing director of Thomas Glover & Co. Ltd., and in 1949 was appointed chairman of the Glover & Main group of companies. An active member of the Institution of Gas Engineers since his election in 1931, Colonel Glover was a firm supporter of its work. He was for many years a trustee of the Benevolent Fund, and in 1955 was elected to honorary membership of the Institution. He was also a past chairman of the Society of British Gas Industries and a Past Master of the Haberdashers Company. Initiated into the Murdoch Lodge in 1911, he was a Past Master of that Lodge and of Lodge No. 26. He also held the rank of Past Grand Steward. A memorial service will be held in London in late September, the date of which will be published.

MR. JOHN HENRY JAMIESON, gas manager at Kirkcudbright for 12 years, collapsed at the wheel of his car in Kirkcudbright and died after being admitted to hospital. He was 48. Mr. Jamieson served on Kirkcudbright Town Council for a period of four years.

Parkinson Cowan Industrial Products

Due to a typographical error in our edition last week, the new address of Parkinson Cowan Industrial Products was incorrectly given. The address should have read Dolphin Works, Fitzalan Street, Kennington, London, S.E.11. We regret any inconvenience caused by the mistake.

Diary

September 5. — NORTHERN JUNIORS: Howdon-on-Tyne Gasworks. 'Colour at Works,' by R. B. Brown. 2.30 p.m.

September 9.—SOUTHERN G.C.C.: The Small Town Hall, Reading. Meeting at 11 a.m.

September 10.—EAST MIDLANDS G.C.C.: Smithy Row, Nottingham. Meeting at 11 a.m.

September 11.—I.G.E., Manchester and District Section. Visit to Stoves Ltd., Rainhill.

September 11. — SCOTTISH WESTERN JUNIORS: 9, George Square, Glasgow. Presidential Address by R. M. Currie. 6.30 p.m.

Cannon introduces the 65-guinea

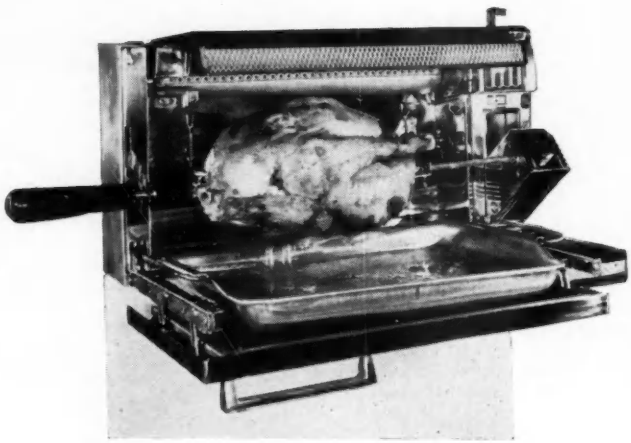
GAS COOKER WITH THE BARBECUE

A NEW Cannon cooker plus Super-chef built-in foldaway barbecue-grill was launched last week at a reception for the Press and the trade, held by Mr. A. F. Oatley, Managing Director of Cannon (GA) Ltd.

Claimed to have the first foldaway barbecue-grill in the world, the new cooker will be available in the Greater London area this month and released to the rest of the country during the autumn and winter. Price: 65 guineas.

Mr. Oatley himself demonstrated how a full-sized chicken or large joint can be simply roasted on the barbecue-grill. Alternatively, it would take a small turkey, or two broiler fowls, or four individual chickens, pigeons or small game. Shortly there are to become available specially-designed spit attachments which will enable the housewife to cook such dishes as Kebabs or Shiskebabs.

The barbecue-grill cooks with both radiant red and black infra-red heats . . . an ideal combination reached after much investigation and experiment. The infra-red (deep penetration) heat makes it possible to cook at temperatures which ensure evenness of cooking with the minimum of fat spitting and loss of weight. The radiant-red takes care of the outer surface, sealing, cooking and finishing colour.



Cannon has devised further improvements of its foldaway high-level grill so that for ordinary grilling purposes the Super-chef is again an advance. It has a larger capacity, more easily handled grill pan, and great stability.

But by far the greatest attraction is, of course, the adventurousness of cooking by barbecue, otherwise known as 'spit-roasting' or rotisserie. This form of cooking has hitherto been the prerogative of the chef. And there are no objectionable cooking smells.

Easily cleaned

A variety of new flavours can be introduced by basting—impracticable in oven cooking. The barbecue-grill is designed so that there is only a minimum of spitting fat, and this is directed to the rear of the barbecue which is easily cleaned. It is also claimed that the development will save fuel.

During grilling operations the spit-revolving motor folds away protected from steam, grease and dust. After grilling the whole unit folds away into 4½ in. of space at the back of the cooker. When again required it is brought into operation in a matter of seconds.

The cooker also incorporates a new design of easily-cleaned spill-over sealed, large capacity hotplate for four 10-in. pans. It has an ideal sized baking oven, a large-capacity storage and warming draw and automatic ignition to oven, hotplate and barbecue.

E.G.B. SALES STAFF DINED AT COLCHESTER

TO celebrate the success of a water heater campaign, the sales staff of the Ipswich Division of the Eastern Gas Board were given dinner at the Red Lion hotel, Colchester, recently.

Mr. J. H. Dyde, Chairman of the Board, presided and the Deputy Chairman, Mr. F. T. Brookes, also attended.

During the eight weeks the campaign ran, 6,426 water heaters of all types were sold, compared with 2,118 sink appliances sold during last year's nine-week campaign.

FACTORY EQUIPMENT EXHIBITION

THE next Factory Equipment Exhibition will be held at Manchester. New arrangements for the benefit of factory and plant management include the grouping of the several hundred different types of exhibits into their various categories.

Equipment and services for which there will be special sections include handling and storage, insulation, protective clothing, air conditioning, instruments and electronic controls, welfare and safety, cleaning and maintenance, product finishing, machines and tools, heating and ventilation, drawing office equipment, business systems and production controls, dust and fume extraction, construction and partitioning, packaging and packing.

This arrangement has been warmly welcomed by industry and already 80% of the space for the next Factory Equipment Exhibition has been applied for and some of the sections have already been fully booked.

Appliance exhibition for 1,000 sales and service delegates

ONE of the features of the sales and service conferences organised by the Gas Council has always been the exhibition of gas and coke appliances. The manufacturers of these goods have taken every advantage of this opportunity to show a selection of their latest models to the delegates—more than 1,000 in number—from gas boards in all parts of the country.

This exhibition will again be held to coincide with the conference at the Royal Hall, Harrogate, on Tuesday and Wednesday, October 6 and 7, 1959.

The exhibition will be staged on the site adjacent to the Royal Hall, and will include commercial and smaller industrial appliances, as well as a wide variety of domestic cookers, water heaters, space heaters, washing machines and refrigerators.

In order that the salesmen and showroom staff attending the conference may have ample opportunity to discuss these appliances with the representatives of the manufacturing firms, the exhibition will remain open until 7 o'clock each evening, and will also be open on the Monday afternoon and evening preceding the conference. Further detailed information will be found in the official programme which will be distributed in the near future.

The Gas Council's space in the exhibition takes the form of a lounge, surrounded by a display of the Council's publicity material. Another display panel will illustrate the activities at the Council's research and testing centre at Watson House.

AND THESE FIRMS WILL PUT ON THE BIG DISPLAY

LIST OF EXHIBITORS

Exhibitor	Stand Number
Radiation Group Sales Ltd.	1
Perl Controls Ltd.	2
Thomas Potterton Ltd.	3
Bratt Colbran Ltd.	4
Electrolux Ltd.	4a
General Gas Appliances Ltd.	5
Falk Stadelmann Ltd.	6
R. & A. Main Ltd.	7
Bolton Metal Products Ltd.	8
Ascot Gas Water Heaters Ltd.	9
Clifford Products Ltd.	10
Wm. Sugg & Co. Ltd.	11
Hattersley Bros. Ltd.	12
Economic Gas Boilers Ltd.	13
North Eastern Gas Board	14
Newton Chambers & Co. Ltd.	15
F. A. Borchardt Ltd.	16
Stoves Ltd.	17
Radiant Heating Ltd.	18
Chas. Portway & Sons Ltd.	19
Wilkins & Mitchell Ltd.	20
Astral Equipment Ltd.	21
Cannon (G.A.) Ltd.	22
Parkinson Cowan Industrial Products Ltd.	23
Jackson Boilers Ltd.	24
Horstmann Gear Co. Ltd.	25
Parkinson Cowan Appliances Ltd.	26
Dowson & Mason Ltd. / J. H. Robinson (Liverpool) Ltd. / Vulcan Stove Co. Ltd.	27
Harris Engineering Co. Ltd.	28
Sidney Flavel & Co. Ltd.	29
George Bray Ltd.	30
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Gas Times	P.2
Walter King Ltd. ('GAS JOURNAL,' 'GAS SERVICE'), etc	P.3
The Gas Council / Watson House	P.4

HYDRO-REFINING PLANT NOW ON STREAM

A NEW hydro-refining plant which, claim the manufacturers, is the first of its type to be built in the United Kingdom, was brought on stream at the Cadishead (Manchester) works of Lancashire Tar Distillers Ltd. recently.

The plant was designed to handle about 100 tons of mixed crude benzole a day from the North Western Gas Board and tar naphtha derived from the distillation of crude tar.

The main hydro-refining equipment was designed and purchased from Germany, and about half of the unit was purchased in the United Kingdom.

The crude product is hydrogenated over a catalyst at 50 atmospheres pressure, the source of hydrogen being cylinder hydrogen. Three streams are taken from the plant; refined motor spirit, refined solvent fraction and high boiling residues.

The main project was built and tested in 15½ months, four weeks ahead of schedule, at a total cost of £450,000.

Gasholder 'on pension'

After 109 years' service, Walsall's oldest gasholder has been 'pensioned off.' Officially known as Number 5 gasholder, it was erected in 1850 in the Wolverhampton Street gasworks, held 280,000 cu.ft. of gas and served the Bloxwich area.

IRISH GAS PRICE REDUCED

DUE to considerable economies at the works, Dungannon (Co. Tyrone) Gas Company has been able to announce a reduction of 7d. per thousand cubic feet in the price of gas.

A more up-to-date method of carbonising coal has been introduced, and tar is now being injected into the furnaces by compressed air, instead of the former practice of using coke for this purpose. Other alterations to the plant have also contributed to the reduction.

New gasholder for N.G.B.

The Northern Gas Board is building a new gasholder at its works at Howdon-on-Tyne. The holder will be 120 ft. high, and will hold 3 mill. cu.ft. of gas.

Stop Press

SIR HAROLD TO RESIGN

AS we go to press it is learned that the Chairman of the Gas Council, Sir Harold Smith, K.B.E., will resign at the end of this year. He will be succeeded by Sir Henry Jones, M.B.E., at present Deputy Chairman of the Gas Council. The new Deputy Chairman will be Mr. W. K. Hutchison, C.B.E., now Chairman of the South Eastern Gas Board.

Sir Henry Jones to be new Chairman

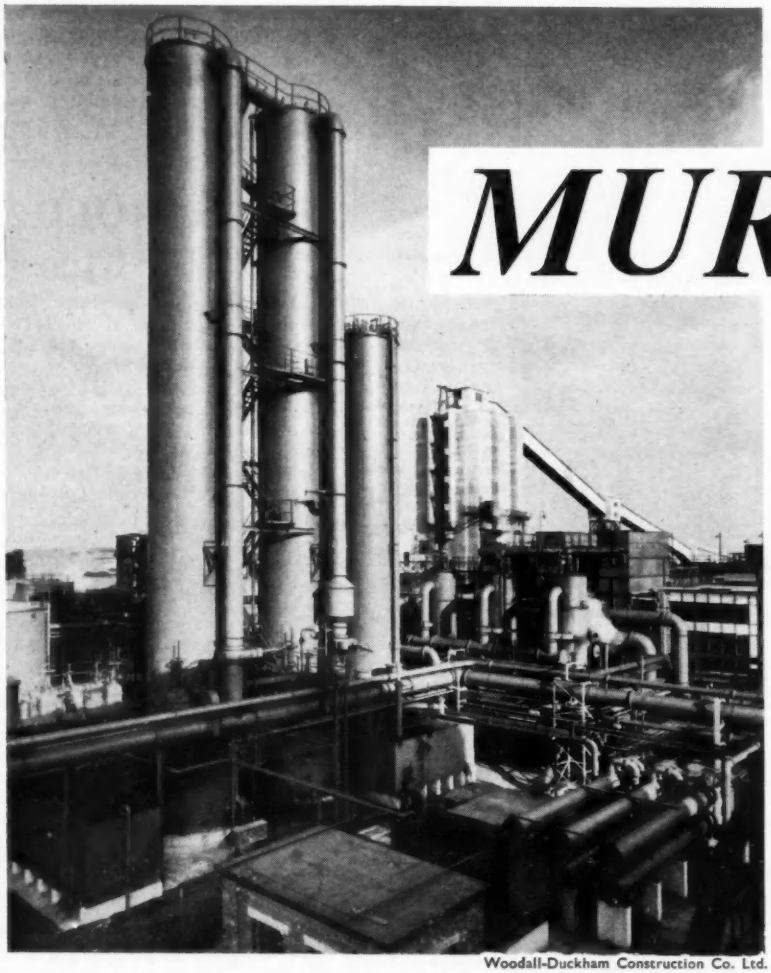
Sir Henry, who is 53, has been Deputy Chairman since February, 1952, and comes from a family which for 125 years has had an almost unique engineering and administrative experience in the gas industry. Educated at Harrow and at Pembroke College, Cambridge, he was articled to the late Sir George Evetts and later became his assistant. Sir Henry had considerable experience of integrating small undertakings and in due course became director of several gas companies and deputy chairman of the former Wandsworth and District Gas Company. During the war he was at Dunkirk with the Essex Regiment and later served in Burma. He received the M.B.E. in 1943 and, in 1945, was demobilised with the rank of Brigadier. In 1949 he was appointed chairman of the East Midlands Gas Board and, in 1956, was mentioned in the New Year's Honours list. Sir Henry, who lives at Weston Turville in Buckinghamshire, has three sons and one daughter.

Mr. W. K. Hutchison to be Deputy

Mr. Hutchison, who is 55, has been Chairman of the S.E.G.B. since 1949. Educated at Edinburgh Academy and Corpus Christi College, Oxford, he joined the Gas Light and Coke Company as a research chemist in 1926. During the war he served at the Air Ministry and became director of compressed gases. After the war he rejoined the G.L.C., becoming a member of the Board in 1947. He was awarded the C.B.E. in 1954. Mr. Hutchison is married and has one daughter.

MURTON

Coking plant, where centralised control is the most extensive in Europe



Woodall-Duckham Construction Co. Ltd.

General view of the by-product plant, with the ovens service bunker in the background.

AN advanced system of centralised instrumentation to assist operation control is the outstanding feature of the new coking plant at Murton, in County Durham.

Here, centralised control has been applied more extensively than at any other coking plant built so far in Great Britain or, for that matter, in Europe; even in the United States there is no carbonising plant to be found with so advanced a system.

Latest Plant

Its installation has made possible better control of coal supply from the blending plant, the improved loading of coke wagons, as well as a more positive control of all ancillary processes with a reduction in the number of men employed.

The new Murton coking plant in the Durham Division of the National Coal Board is the latest of four major coking plants to be completed in this Division since nationalisation. The other three are at Fishburn, Lambton and Monkton. The plants illustrate the present policy of the N.C.B. of concentrating metallurgical coke manufacture in a limited number of modern plants within easy access of newly developed collieries.

In this way, not only has it been possible to lay out up-to-date carbonising plants on sites providing plenty of room for possible future extensions, but to incorporate the most modern means of mechanical handling equipment to implement to the full the advantages to be gained from centralised coal mining and coal treatment plants.

Coals from more than one seam can be wound at a single pit, washed, blended and supplied to the coke oven plant with the minimum of handling. At this new plant, coal from the Murton, Eppleton and Elsmore collieries will be raised at the new Hawthorne shaft adjoining the coking plant, cleansed at the new washery and be passed to the coke ovens.

The capacity of the new carbonising plant is 1,000 tons of coal a day, equivalent to a production of 250,000 tons of high-grade metallurgical coke a year, together with some 7.5 mill. cu.ft. of gas a day made available to the Northern Gas Board. By-products include concentrated ammonia, tar and the production of about 1 mill. gal. of crude benzole annually.

The main contractor for the plant is the Woodall-Duckham Construction Co. Ltd., and the complete installation includes a comprehensive crushing and blending plant with a storage capacity of 3,200 tons. The bunkers, constructed of reinforced concrete, are divided up into eight compartments, in line, each with a capacity of 400 tons, over which is located, in a concrete head house, a reversible shuttle conveyor. By this means coal either ¼ in. to 0 or 1 in. to 0, received from the washery at the rate of 250 tons per hour, can be distributed to any bunker as required.

At the hopper outlet of each bunker there is a rack and pinion operated

door through which the coal is discharged to a travelling constant weight belt feeder. There are four of these feeders which can be used for the discharge of any bunker as needed.

Each capable of handling from 15 to 80 tons of coal per hour, they feed coal on to a 30-in. belt conveyor travelling at a predetermined rate, which transports it to the coal crusher house. Here a 72-in. flat belt conveyor delivers it into the crusher, an electrically-driven swing hammer pulveriser with a capacity of 200 tons per hour and capable of reducing the coal to 80% through a ¼-in. square mesh. Space has been left for the installation of a second crusher at some later date. Provision has been made for bringing blended coal from stock in lorries and tipping it into an underground bunker at one end of the blending bunkers. From here, vibrating feeders discharge it on to a 30-in. belt, fitted with a belt weigher, to join the coal from the main blending bunkers on its way to the crushers.

Vibrating Feeder

Breeze may also be used for blending. It is brought in railway wagons from the coke screens and after being discharged to an underground track hopper, passes through a vibrating feeder to an 18-in. belt conveyor to be carried to a rod mill before being transported by a second 18-in. belt conveyor to the main blended coal belt. The present capacity of the rod mill is 3½ tons per hour, but there is provision to increase it to from 8 to 10 tons per hour in future.

The crushed, blended coal (the crusher may be by-passed if blended coal is to be put into stock) travels on a 42-in. belt conveyor to a combined transfer station and vehicle loading hopper. Here, by a system of flygates and chutes, the crushed coal is delivered to a 30-in. belt for subsequent transport to the coke oven service bunker, and the uncrushed coal to a 50-ton capacity hopper underneath. From this hopper blended coal is transported in vehicles to the open coal store.

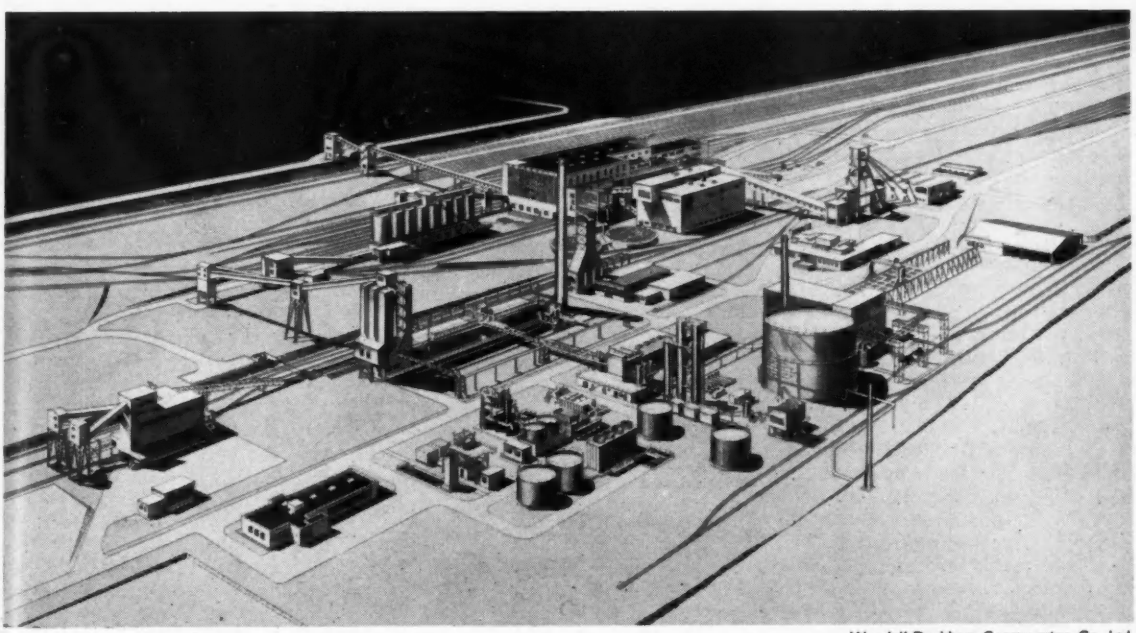
In a dust-free air conditioned room underneath the blending bunkers is the coal handling plant control desk. Here an illuminated mimic diagram panel gives the operator all the information he needs for the running of the plant, from the delivery of washed coal to the blending bunkers, to its final discharge into the coke oven service bunker. The panel shows which conveyors are running, the position of the flygates and the amount of coal in each bunker. Fielden-Tekton electronic level indicators show when any bunker is full.

The operator controls the stopping and starting of the coal stream by switches on the desk, but before any individual item of plant can be started, a series of warning bells ring for an adjustable, predetermined period in its vicinity. The plant can then be started up in the correct order according to the setting of the flygates, as shown on the mimic diagram panel. Also at the control desk are the high tension circuit-breaker controls and indicators for two crusher motors, though only one is at present installed. The capacity of the coal handling plant is 200 tons per hour of crushed blended coal.

The carbonising plant consists of two separate batteries, each of 25 ovens, built in line with the coal service bunker at one end and the chimney stack at the other. The ovens are of the W-D Becker combination underjet type which can be fired either by rich coke oven gas, or by producer gas, should the necessary plant be installed later. Each oven is 40 ft. 9¼ in. long between the doors, 13 ft. high, with an average width of 18 in. and is built of first-class silica from the pad upwards, except for the regenerator filling, the oven soles and the end walls adjacent to the pinion walls, which are of fireclay. The regenerator facings and oven top are insulated.

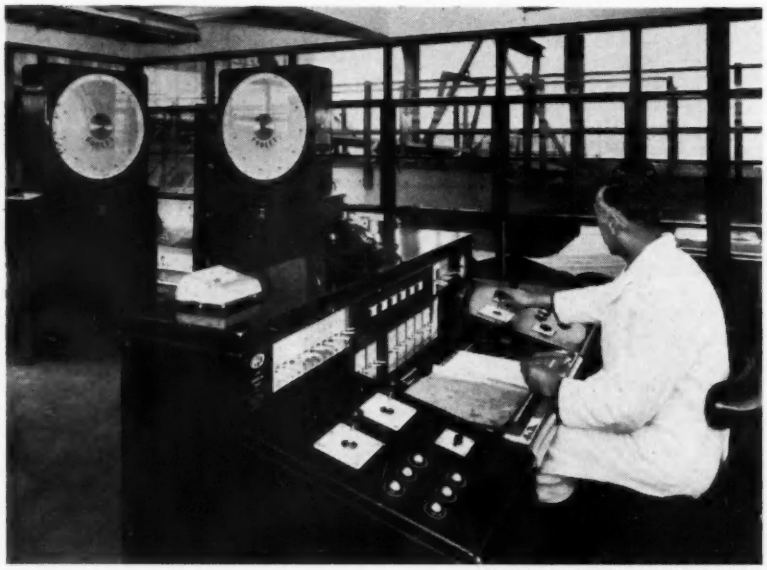
Special Design

The fireclay blocks forming the regenerator filling have been specially designed with a large surface area to improve the heat exchange between the waste gases and the air or producer gas, which allows the use of a small, highly efficient regenerator. A recess in the bottom of each block forms—when in its position in the regenerator—a series of unobstructed tunnels running from front to rear. Any dust is, therefore, easily detected and can be



Woodall-Duckham Construction Co. Ltd.

A perspective wash drawing showing the layout of the units of plant at the Murton works. The very spacious layout is immediately apparent, so also are the relative positions of the colliery buildings, including the new washery and the coal blending plant for the coke oven batteries. On the right, behind the gasholder is the power house.



Woodall-Duckham Construction Co. Ltd.

The coke handling control room showing the operator at the control desk and two of the coke weighers. The 'domestic' coke boom loader can be seen outside. The simplicity of design of the control desk and the care and thought given to the placing of all operating switches and levers is at once apparent.

removed by a compressed air lance inserted after the removal of brick plugs in the bulkhead walls.

The waste gas flues, running along either side of the battery, are of reinforced concrete lined with firebrick, and just beyond the point where they join before entering the base of the stack at the end of the batteries, an Askania automatic regulating damper for draught control has been provided. The stack itself is 234 ft. high and bricklined for the first 70 ft. above the waste gas inlet. The oven doors are clay luted and a door changing and repair station is located at the stack end of the battery.

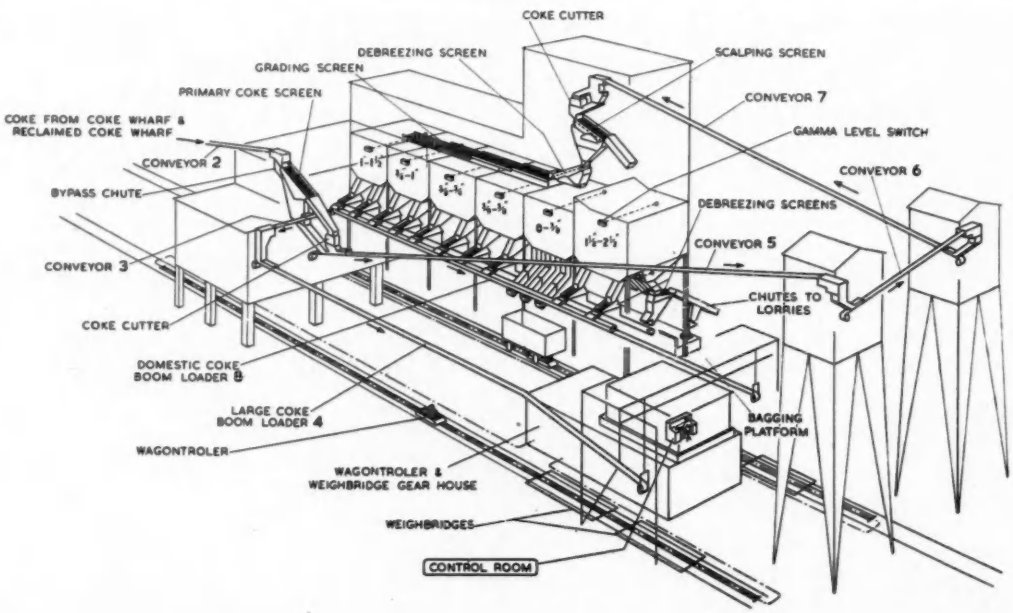
The battery control room is at bench level at the coal bunker end of the batteries. Here also is the reversing machine which is fitted with totally-enclosed gearing running in oil. Electrically driven, with a steam drive as standby, its movements are controlled by an electric clock which can be set to allow various intervals between 'change-overs.' Emergency push-button control has been provided and should the clock fail to operate the machine at the predetermined time, an alarm is automatically sounded.

At this end of the batteries, too, space has been left for building additional carbonising plant at some future date, should the demand for metallurgical coke from this works increase.

The oven service bunker, constructed of reinforced concrete and approximately 138 ft. high, has a total capacity of 2,200 tons of washed crushed coal; contained in it is a separate compartment of 700 tons capacity which can be used for storing coal for experimental purposes. There are 12 pneumatically-operated discharge gates in three rows of four, and the coal charging car is filled by opening one set of these gates, controlled from the charging car itself.

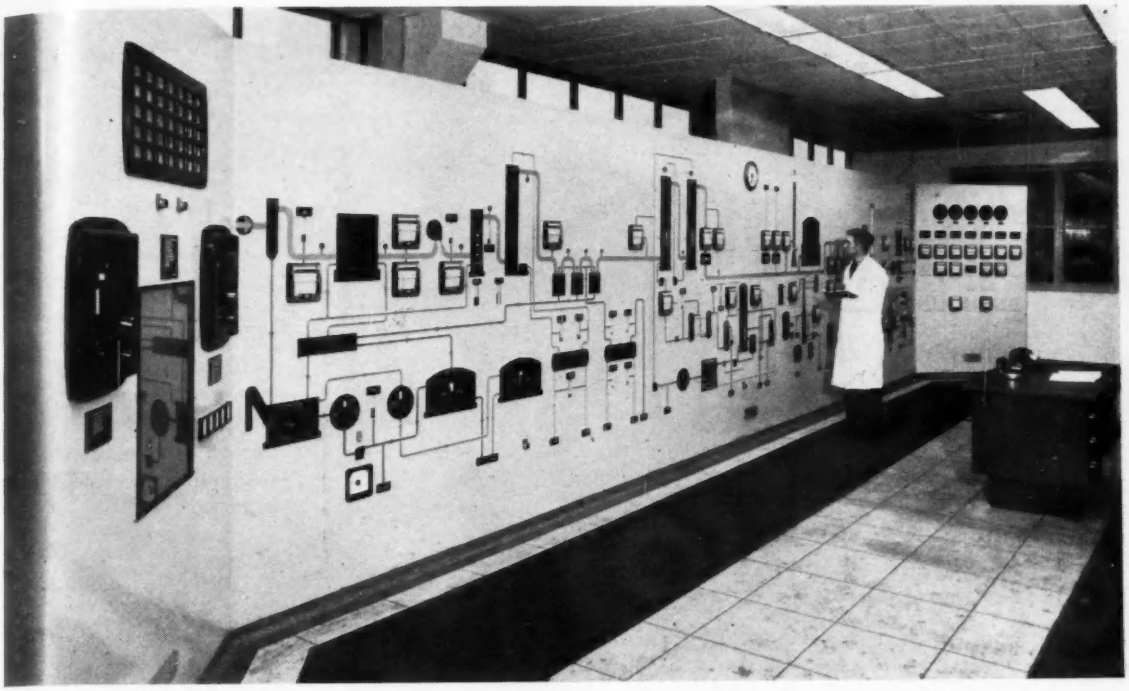
Coal Charging

The coal charging car is of the portal type and is electrically propelled. Its four steel hoppers have a total capacity of 17 tons and each is fitted with an adjustable measuring device and an electrically-driven vibrator to facilitate discharging. The four quadrant gates can be individually operated by hand levers in the car's cabin and so also can the mild steel telescopic dropping sleeves. The latter, though they can be raised



Woodall-Duckham Construction Co. Ltd.

Diagram of the layout of the coke handling plant showing the positions of the primary screen and the main grading plant in relation to the control room. The gamma ray switches indicating whether a bunker is full are shown diagrammatically in each sized-coke bunker.



Woodall-Duckham Construction Co. Ltd.

A view of the by-product and benzole plants control panel in the central by-product plant building, showing the operator noting the reading of certain instruments. The instruments measuring budgetary control data are on the extreme right and on the extreme left the annunciator board is seen at the top of the panel.

and lowered independently, are interlocked so that the car cannot move unless all four are raised.

The pusher, a combined machine which travels the length of the batteries, is of very robust construction, weighing some 96 tons, and runs on heavy section track rails, laid on a reinforced concrete foundation. The ram is built of structural steel with a cast steel head and is fitted with manganese steel wearing plates and a cast steel supporting shoe. It is rack and pinion driven. The leveller, also of structural steel, is wire rope driven, while the door extractor is rack and pinion operated.

Transmitter

Separate electric motors are provided for each operation and the pusher driver seated in a special armchair unit, controls all these operations with considerable ease and freedom from strain or fatigue, a most imporportant consideration when a long, uninterrupted pushing schedule is being undertaken. So far as is known, this is the first control unit of its type to be fitted to a pusher machine.

Pushing is controlled by the W-D Gamma interlock system which depends upon a beam of gamma rays passing from the coke guide to the pusher machine through the space above the charge. The charge cannot be pushed, therefore, until both doors have been removed and pusher and coke guide correctly aligned.

The transmitter, a solid steel container mounted on the coke guide, houses cobalt 60, and is fitted with a shutter actuated by a hydraulic thruster. When the shutter is opened a beam of gamma rays passes through the oven roof space and impinges on the geiger counter receiver mounted on the pusher. A relay actuated by radiation is fitted to the receiver and closes a master switch in the 'ram forward' travel power circuit. A 'fail safe' device is included in the design of the receiver, but in an emergency, pushing may be stopped by a push-button control in the coke guide which closes the transmitter shutter, or by a control in the coke car locomotive by which a high frequency signal is injected into the overhead power lines. This signal is picked up by the pusher's power lines and causes a relay to operate in the 'ram forward' circuit. There is a ram changing station at the chimney end of the battery where a spare ram and leveller are kept available.

Quenching

The hot coke discharged from the oven is received by the coke carrying car and transported to a quenching station where it is quenched by a predetermined quantity of water. The quenching station, of the recirculation type, consists of a reinforced concrete, brick-panelled wind shield and a timber tower rising 110 ft. above rail level.

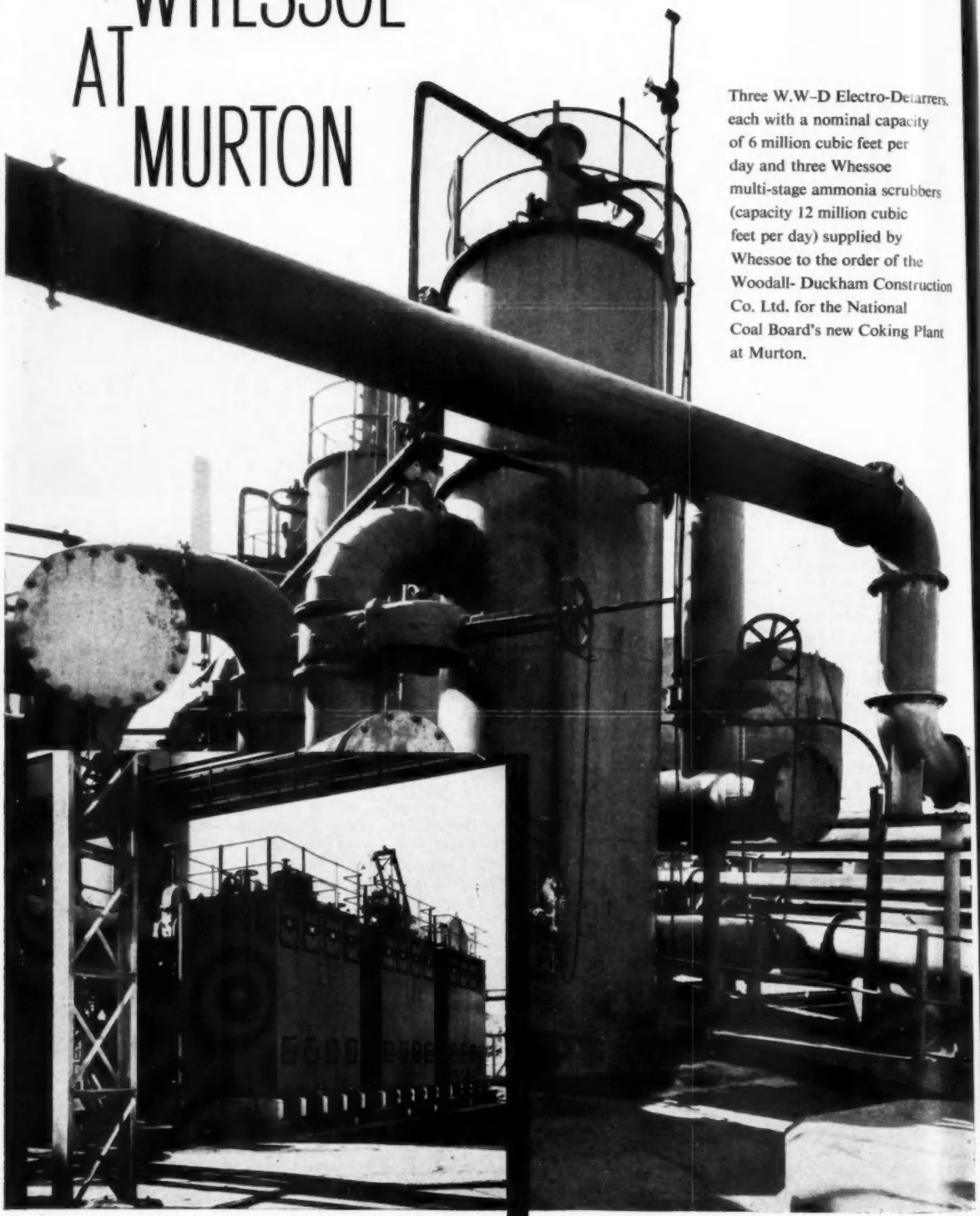
This tower, supplied by the Visco Engineering Co. Ltd., acts as funnel, and by discharging all water vapour caused by quenching, at this height, keeps the site relatively free from condensation at the moment of quenching. It is constructed of a Columbian pine framework and clad with red deal sheeting. Water from a 10,000 gal. overhead tank is sprayed on the hot coke by a hydraulically-operated quick opening valve, automatically controlled by the car as it enters the station.

Carriers

Two electrically-driven centrifugal pumps of 36,500 gal. per hour capacity, one standby, deliver water from the pump sump below ground level to the overhead tank from which they are operated automatically by a float. A breeze hoist and grab, travelling on an overhead track, recovers breeze from the settling sump and delivers it direct into railway wagons.

The coke oven doors must be sealed with clay lute before the oven is recharged. A conventional mortar mill is used to grind the clay mixture for making the lute and two electrically-operated clay lute carriers, running on rails, one on each side of the ovens,

WHESSOE AT MURTON



Three W.W–D Electro-Detarrers, each with a nominal capacity of 6 million cubic feet per day and three Whessoe multi-stage ammonia scrubbers (capacity 12 million cubic feet per day) supplied by Whessoe to the order of the Woodall- Duckham Construction Co. Ltd. for the National Coal Board's new Coking Plant at Murton.

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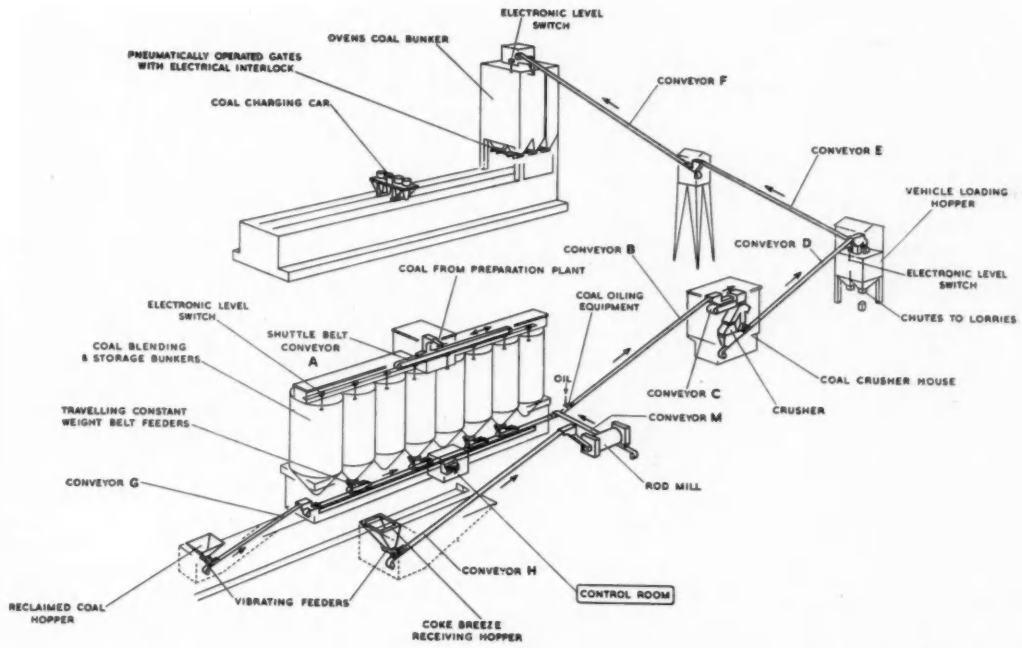


Woodall-Duckham Construction Co. Ltd.

Diagram of the coal handling plant, showing the eight blending bunkers, the receiving hoppers for reclaimed coal and for coke breeze, the vehicle loading hopper and the various conveyors to the oven service bunker.

considerably ease the work of the operators and ensure efficient luting. Each carrier is equipped with two separate motors, one for travelling and the other for driving the screw-operated elevator for the man luting and his clay box. The latter motor is provided with travel limit switches. Since these carriers are also used for carrying out inspections and for cleaning door jambs, they are equipped with adjustable heat screens to protect the operator when he is carrying out these duties.

After quenching, the coke is discharged on to the coke wharf. From here the 36-in. coke wharf conveyor delivers it at 75 tons per hour to a second 36-in. belt conveyor which, in turn, elevates it to the coke screening station. From the primary screen, a single deck vibratory screen separating all coke above 2½ in., there are two courses open to the oversize: it is delivered by chute either to a 36-in. belt conveyor and so to the 42-in. 'large coke' boom loader for loading to railway wagons, or alternatively to the coke cutting machine supplied by Robert Cort & Son Ltd. This can deal with 50 tons per hour and reduces it to below 2½ in.

The undersize coke, together with that from the cutter, or run-of-oven coke from a chute by-passing the primary screen is carried by three 36-in. conveyors in series via two transfer stations back to the screening station, where it is delivered either direct to the secondary screens or first to a secondary coke cutter. At the secondary screens, the following sizes are separated and stored in their respective bunkers: Breeze (0 to ⅜ in.); ⅜ in. to ⅝ in.; ⅝ in. to ¾ in.; ¾ in. to 1 in. and 1 in. to 1½ in. The building housing the screening plant and storage bunkers is a steel-framed structure clad with asbestos-cement panel sheets.

Screening Plant

The coke hoppers are also made of steel and are lined with Gunite. The five main compartments have a capacity of 30 tons each and the breeze bunker 17 tons. All grades of coke, except breeze, can be delivered over debreezing screens, supplied by A.C.E. Machinery Ltd., either by a 42-in. domestic coke boom loader to railway wagons or direct to lorries. Graded coke may also be passed to either of two weighing and bagging machines on the lorry loading side. Breeze from the storage hopper can be delivered to either railway wagons or lorries, but from the debreezers to lorries only. All railway line has been supplied by Thos. W. Ward Ltd.

The screening plant is equipped with a complete dust extraction unit, by which coke dust is extracted from all the various screens and chutes, and conveyed by a ducting system to a Rotoclone and subsequently hoppered.

Coke from stock for rescreening is brought to the reclaimed coke wharf, a reinforced concrete structure 6 ft. long and surfaced with blue bricks, from which it is fed through discharge gates on to a 36-in. belt conveyor. This passes through a reinforced concrete tunnel under the railway tracks to discharge the coke on to the main coke wharf belt from the ovens before it enters the screening station at the primary screen. A separate conveyor and hopper is being installed so that run-of-oven coke from the main wharf belt may be put directly into stock.

Like the coal handling plant, the coke handling and screening plants are centrally controlled. The intricacies of this control are more exacting and probably demand even clearer thinking on the part of the operator. The control desk, to which all the necessary information is brought and from which the operator can set in motion the different sections of the plant under his control, has been placed in a dust-free, air conditioned room with windows on all sides, located above rail level.

By means of two wagontrolers under the control of the operator, all wagons being loaded with coke from the two boom loaders are marshalled and moved into position under anti-spillage chutes at the head of the boom loaders. The loading and weighing of full and empty wagons and the starting up of all coke conveyor belts are under the supervision of the controller (operator), who is provided with a diagram panel and indicator lamp to show which sections

of the plant are in operation and whether the coke hoppers are full or empty.

To indicate the state of the coke hoppers by 'high' or 'low' level light signals on the panel, gamma ray equipment has been used. Suitably shielded, radio-active cobalt 60 has been placed in appropriate positions between the sides of the coke bunkers and the adjacent walls, and by means of suitable electronic equipment using the Isotope Development's gamma switch, signals indicating the state of the bunkers are received at the panel. As with the coal handling plant, warning bells are sounded before any part of the equipment is set in motion. All coal and coke handling conveyors have been supplied by W. J. Jenkins & Co. Ltd.

Condensers

The crude gas leaves the ovens through ascension pipes on the pusher side and passes to two collecting mains, one for each battery. The two off-take mains, in which have been fitted Askania pressure regulators, are connected to a common suction main, which spans the pusher track and terminates at the downcomer pipe at the inlet of the primary condensers. The ascension pipes are fitted with liquor sprays and steam connections have been provided to reduce atmospheric pollution during charging. In the collecting mains, liquor sprays have been placed at every alternate oven and each main has a liquor sealed bleeder and pitch trap.

There are three primary condensers, one standby, with provision for a fourth at some later date. They are of the indirect, tubular type and stand on an elevated concrete plinth forming part of the central by-product building. From here the gas passes to the exhausters and the remainder of the ancillary plant.

There are two turbine driven, two-stage, double flow exhausters—one as a standby—supplied by Richardsons Westgarth Ltd. Each has a maximum capacity of .874 mill. cu.ft. per hour, delivering against a pressure of 2 p.s.i. and are big enough to deal with extra gas made in any proposed future extensions of the carbonising plant. They are direct-coupled to high-speed impulse steam turbines operating at 150 p.s.i. and exhausting against a pressure of 15 p.s.i.

The exhauster house forms part of the central by-product building and it is in this building also, in a slightly pressurised room, that the central panel controlling the by-product and benzole plants is to be found.

Undoubtedly this is the outstanding feature of the Murton coking plant. Together with the coal and coke handling control systems, already described, it has made possible a degree of near automation in the working of a coking plant which has never before been achieved. Apart from its value as a means of centralised instrumentation, it has made possible an appreciable reduction in the number of operators employed.

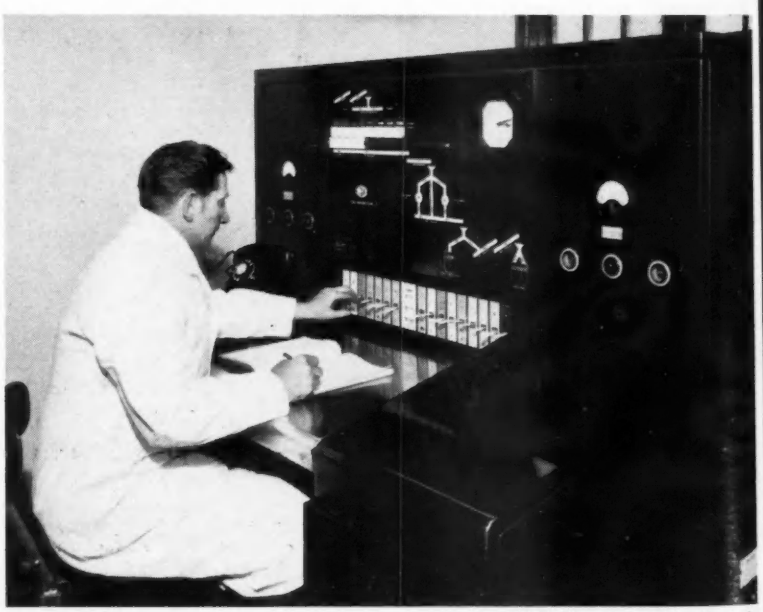
A graphic panel, some 40 ft. long, provides minute-by-minute information on the flow of coke oven gas, producer gas, ammoniacal liquor, tar, benzole, wash oil, water, steam and air, and most of the operation of the plant is controlled from here. Designed by the Woodall-Duckham Construction Co. Ltd., and manufactured by Foxboro-Yoxall Ltd., it consists of a central graphic section with wing panels at each end. It employs some 80 controllers and recorders, together with pilot indicator lights, alarm signals and other devices.

On the graphic panel the representation is arranged horizontally, with the main gas stream shown moving from left to right. Individual items of the plant are portrayed on the panel and the instruments and associated equipment are mounted at appropriate points relative to their functions. The various process lines are colour coded to denote the nature of the product flowing through them. Where there are alternative or stand-by units of plant, only one unit is shown, but in order that the operator may determine which unit is in operation, a system of tell-tale lights provides identification. These lights are in addition to the alarm system described later.

The indicating and recording instruments are actuated by pneumatic signals received from field-mounted transmitters situated at the requisite measurement points on the plant. The panel-mounted controllers transmit set point signals to the actual control units located close to their associated control valves. Where a recorder is linked with a controller and functions as a control station, the set point adjustment can be made from the front of the panel. The controllers are force balance instruments which respond instantly to the smallest changes in measurement and set pressures, and are capable of four control actions; proportional, proportional-derivative, proportional-reset and proportional-reset-derivative. The indicators use a red nylon ribbon behind a graduated glass scale to create an effect of a rising and falling column. The indicators, recorders and controllers are of the Foxboro-Yoxall Controsol type.

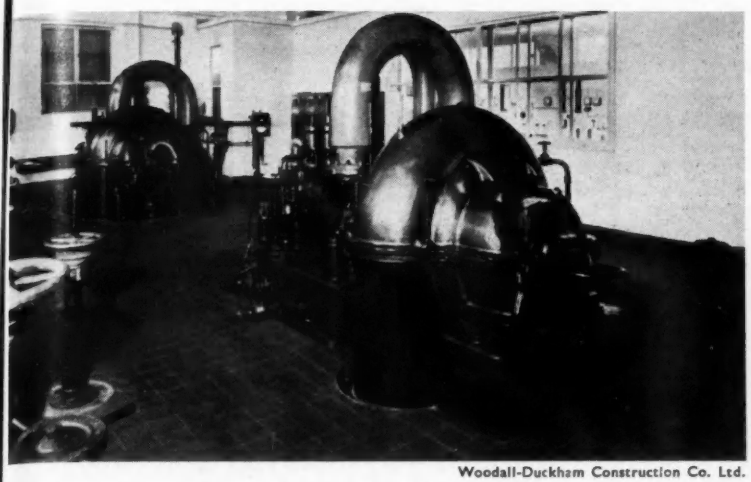
Potentiometers

On either side of the graphic section of the panel there are two wings arranged at a slight angle. On the right hand wing is presented essential budgetary control information which falls outside the scope of the graphic presentation. Here, in particular, instruments record steam pressures and record and integrate steam flows



Woodall-Duckham Construction Co. Ltd.

The operator at the coal handling control desk. The mimic diagram can be clearly seen showing what conveyors are in action and the state of the bunkers. The extreme neatness of the finger-tip controls are a feature of the design of this panel.



Woodall-Duckham Construction Co. Ltd.

The interior of the exhauster room showing the two turbo-driven exhausters, each of which is big enough to handle all gas made at the works. A glimpse of the control panel appears through the window in the background.

to individual plants. Blank cutouts in the panel have been left to allow more instruments to be installed when the plant is extended.

On the left hand wing there are two key switch potentiometers, a multiple column mercury manometer, and an annunciator board which forms part of the comprehensive alarm system. The potentiometers make it possible to take additional temperature readings at points where continuous readings are not required, while the multiple columns of the manometer show clearly and compactly the progressive changes of pressure in the gas purification system, which are recorded by pressure transmitters installed throughout the system.

Precautions

The annunciator board at the top of the left wing gives audible and visual warnings when selected measurements depart from normal values. An alarm bell rings and at the same time flashing lights appear on the graphic panel and at the relevant annunciator section, showing where the measurement has deviated. By pressing an acknowledgment button, the operator silences the bell and switches the signal lights to steady. When the necessary corrective action has been taken, the panel and annunciator lights are automatically restored to normal.

It is clearly necessary that the instruments should continue to function under all circumstances, so every precaution has been taken. The air is supplied by an electrically-driven compressor and an air dryer, but there is also a steam-driven standby. There are alarms on the panel to give adequate warning of air pressure failure so that the standby set can be started up before there can be any instrument failure. Alarms also call attention to any excess humidity in the air leaving the dryer. The continuity of the electrical supply to the instruments is equally important, so an automatically charged standby battery will take over should the main power fail.

Leaving the exhausters, the gas enters the electrostatic detarrers. There are three Whessoe W-D detarrers of the vertical tube and suspended wire electrode type, each 6 ft. 6 in. in diameter. Usually, all three are in use, but when necessary, any two will handle the normal gas load without loss of efficiency. Space has been left for a fourth vessel. Each unit has its own transformer rectifier set, though the capacity of any two sets is large enough to operate all three units if necessary.

To cool the gas before the ammonia washers and for naphthalene removal, it enters the secondary cooler, in which the cooling medium is petroleum oil. The cooler vessel is hurdle filled and fitted with a mist eliminator and steaming out facilities. The drain from the cooler flows into a 6,000 gal. decanting tank, supported on concrete saddles underneath the cooler, where any condensed water separates from the oil.

Any benzole in the vapours vented from the tank is recovered by a vent scrubber containing ceramic rings and irrigated by an oil bleed from the pressure line serving the cooler. To cool the oil, there is a range of six water-cooled, floating-head, heat exchangers through which the oil is pumped from the decanting tank on its way back to the gas cooler. The two pumps, one standby, are direct coupled, electrically driven centrifugal pumps of 45,000 gal. per hour capacity. Two more heat-exchanger units will be added when the plant is extended.

The cooled gas passes to three Whessoe ammonia washers operating in series, any one of which may be bypassed and the normal gas load handled efficiently by the remaining two. They are four-chambered units and the washing medium is normally filtered waste liquor from the concentrated ammonia plant, but soft treated water may be used in the last bay of each washer. All liquor is pre-cooled by four floating-head liquor coolers before entering the washers. Should the carbonising plant be extended, the washers would be duplicated and provision has been made for this.

Benzole Stripping

Any moisture entrained in the gas at the outlet of the washers is trapped in a vertical down-flow water separator as the gas passes to the benzole scrubbers. There are two scrubbing units, each 11 ft. 6 in. in diameter by 106 ft. high. Though normally operating in series, either can be by-passed; each scrubber is complete with a benzolised oil tank and the second includes an oil separator at the gas outlet. Equipment is also provided for washing both scrubbers with hot water or creosote oil.

The benzole-enriched wash oil is stripped of its benzole, in the crude benzole plant. The benzole so obtained, after cooling, is passed to a water separator and thence to a 300 gal. running tank. From here it is delivered by a 500-gal. per hour centrifugal pump to the carbon disulphide stripping column, after which the treated benzole runs into a 12,000-gal. running tank divided into two equal compartments. Should the CS_2 still be temporarily shut down the crude benzole can be returned by suction line to the still. Finally, the benzole, free of CS_2, is stored in two 50,000-gal. tanks from which it can be loaded into rail or road tanks. The carbon disulphide recovered in the still passes through a floating head condenser to a decanter and flows to a drumming tank of 2,000-gal. capacity fitted with a steam coil.

Distribution

The gas stripped of benzole passes to the single-lift, spirally-guided gasholder of 200,000 cu.ft. capacity. Manufactured by Newton Chambers & Co., Ltd., it is equipped with an anti-freezing device and an automatic control valve connecting it to the surplus gas bleeder.

Gas not required for underfiring the coke ovens or at the boiler plant is diluted with producer gas to a calorific value of 485 B.t.u. per cu.ft. for dis-

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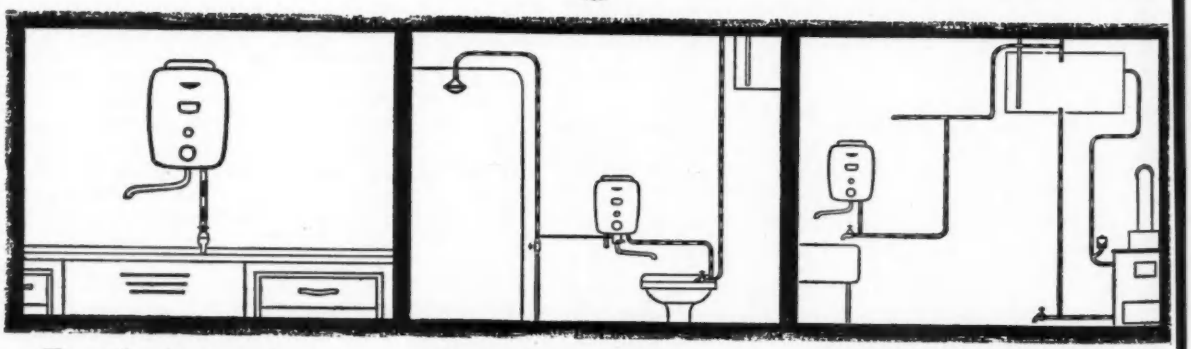

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At the sink or washbasin, connected to main or tank supply, the Apollo provides instantaneous hot water, at 0.5 gallons a minute, at a constant 140°F, irrespective of fluctuations in the water input temperature.

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With its constant temperature output the Apollo provides an efficient inexpensive shower supply. Dilution by cold water feed gives selected water output temperatures.

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Connected to the draw-off pipe of an existing hot water system the Apollo will boost the system's output at that point to a temperature of 140°F. For the utmost economy, it makes the most of any storage system.

Instant hot water at a Thermostatically Controlled temperature!

MAIN WATER HEATERS LIMITED · GOTHIC WORKS · CROYDON · SURREY

Note the name-made by MAIN

W150

tribution by the Northern Gas Board. The two gases are effectively mixed by a system of concentric perforated pipes, carrying the producer gas, arranged in the coke oven gas main. A ratio controller governs the proportion of producer gas entering the rich gas stream.

Purifiers

Two Sirocco-type motor driven, oil-cooled, booster fans, one stand-by, deliver the gas for distribution to the dry purification plant. These fans, with a capacity of 300,000 cu.ft. of gas per hour at S.T.P. at an outlet pressure of 40 in. w.g. for an inlet pressure of 6 in. w.g., are housed in the main by-product building, and provision has been made for installing a third fan.

A controlled limit switch will automatically stop the fan motors as soon as the gasholder falls below a predetermined level.

The purifiers with a maximum capacity of 10 mill. cu.ft. per day have been supplied by R. & J. Dempster Ltd., and consist of five welded steel boxes, built as one unit and containing 24 trays in six tiers.

A 25-ton Goliath crane for handling the trays of oxide is fitted with an automatic lifting bale which makes it possible to dispense with manual attachment or removal. Other equipment provided includes conventional mobile oxide crushing, disintegrating and conveying machinery.

Differential

The gas entering the purifiers may be pre-heated by means of a primary steam-heated gas heater and by secondary heaters fitted to each box, all of which are controlled by automatic thermostats. In addition, temperature and humidity conditions may be controlled by 'open' steam, supplied through calibrated valves, and by water sprays attached to the inlet connection of each box. The pressure differential across the installation and the temperature change across each box is telemetered to instruments in the central control room, though a local instrument panel is also provided. This is housed in a control building adjacent to the purifiers, which also contains a semi-portable oil-fired inert-gas generator, switchgear and pumps.

A Holmes-Connersville meter of 12.6 mill. cu.ft. per day capacity measures the volume of purified gas passing to the Beliss and Morcom compressors. There are three of these compressors, each with a capacity of 5.33 mill. cu.ft. per day at S.T.P. and delivering at 30 p.s.i. of the two crank, single stage, double acting type. They are similar to those installed at other coking plants in this division; two are electrically driven and the third, equipped with a variable speed gear, is steam driven. Each compressor has an after-cooler of some 650 sq. ft. cooling area.

An official testing room for the maintenance of the declared calorific value of the distributed gas is also included in the main by-product building.

Producer gas for dilution is made in two 4 ft. 11 in. diameter Gibbons-Heurty H.W.J. 18 gas producers, manufactured by Gibbons Bros. Ltd., of sufficient capacity to meet both present and possible future needs after the extension to the carbonising plant. Each producer has a double sealed, hand charge hopper and is fitted with a mechanical grate and motor-driven ash pan. Two motor-driven blast fans, fitted with governors, supply air at constant pressure. Gas cooling and washing is affected by two fabricated steel precoolers, each superimposed above a wash box; two motor-driven gas washing fans, with provision for a third, two spray separators and a 7 ft. diameter mild steel scrubber, complete the gas washing equipment.

Coke for this plant is stored in a 7-ton reinforced concrete hopper from which it is discharged to a coke skip and elevated by an automatic skip hoist to the storage bunkers above the producers.

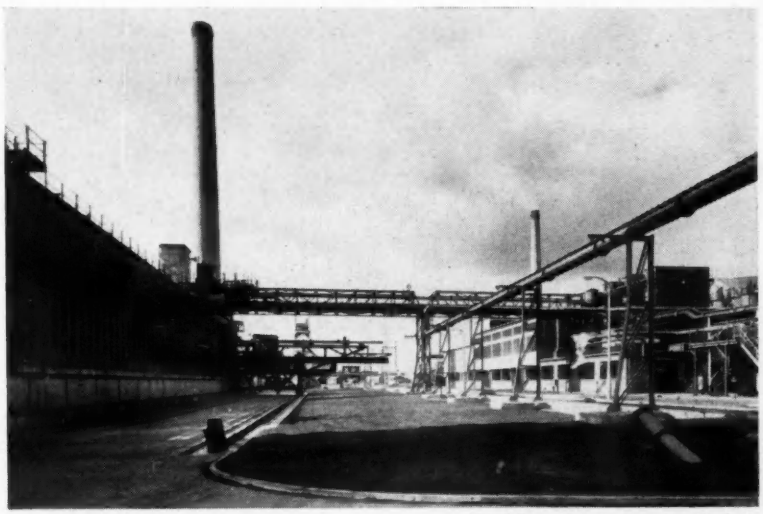
The plant is housed in a steel-framed building, the top part of which is clad with asbestos sheets and the bottom half brick panelled. It is conveniently situated in the by-product area of the works and nearby pumps supply the necessary water for the gas washing equipment.

There is a comprehensive tar-liquor handling system by which those parts of the plant either producing liquor, or using it as a washing medium, are well served. On the ovens themselves, the return flushing liquor from the ascension pipes and the heavy condensates from the pitch trap of each collecting main, flow back through the suction main to the liquor flushing tank, where the tar is separated before recirculation of the liquor. With a 45° slope at the inlet and a decanting capacity of 34,000 gal., this tank is divided into two compartments, each provided with a scraper conveyor for the continuous removal of residue for discharge through sludge valves and heated outlet hoppers. Tar overflows into a receiving tank of 5,000-gal. capacity and liquor is decanted into a 10,000-gal. tank.

Tar and Liquor

A reinforced concrete liquor sump is divided into three compartments, one of 4,500 gal., which receives the liquor from the ammonia washers, and the other two of 3,000 gal. each, which receive the hot and cold condensates respectively. From the cold condensate compartment, a tar leg, fitted with an adjustable sleeve, transfers the tar from the cold condensate to the hot condensate compartment while the decanted liquor overflows into the strong liquor compartment.

Four steam-driven Duplex tar and liquor pumps, located in the by-product building, serve the tar and liquor system. One pump transfers



Woodall-Duckham Construction Co. Ltd.

The pusher side of the oven batteries and the central by-product plant building. The very spacious layout and the modern design of the buildings is immediately apparent.

liquor and tar to the liquor flushing tank from the hot condensate compartment; a second transfers tar from the tar receiver to two 150,000-gal. storage tanks; a third, liquor from the strong liquor compartment to its 150,000-gal. storage tanks, while the fourth is a general standby. The pumps installed throughout the coke oven plant have been supplied by Joseph Evans & Sons (Wolverhampton) Ltd. and Gwynnes Pumps Ltd.

Concentrated Liquor

Strong liquor from the storage tanks flows to a 600-gal. feed tank for the automatically controlled concentrated ammonia liquor plant supplied by R. & J. Dempster Ltd. The concentrated liquor as produced passes to one of two 2,000-gal. daily make tanks, constructed of cast iron and lined with acid-resisting brick, and is pumped to either of two 25,000-gal. storage tanks. By the same pump, an 8,000-gal. per hour motor driven centrifugal pump, the liquor can be transferred to a tubular loading column serving road or rail tanks. The gas bled off from the dissociator section of the plant is treated in a fume scrubber before entering the main gas stream at the primary condensers.

The hot effluent liquor from the base of the still gravitates to a 5,000-gal. sump, from which a proportion is pumped to the ammonia washers, while the remainder, passing through a natural draught cooling tower to the surplus effluent sump, is discharged at a controlled rate to the sewers.

Circulating System

The works water cooling plant consists of two independent, closed circulating systems, each complete with a cooling tower, cold wells and the necessary suction and delivery water piping. Circuit A serves the primary condensers, the exhauster oil cooler, the gas compressor jackets, the after coolers and the air compressor cooling system; circuit B serves the secondary gas cooler, the ammonia liquor coolers, the crude benzole and wash oil coolers and the crude benzole condenser at the carbon disulphide column. Make up water for both systems is pre-treated in a separate water treatment plant. The cooling tower in each circuit is the timber induced draught type, supplied by Film Cooling Towers Ltd. Each consists of two independent cells arranged so that a third can be added if the plant is extended. In circuit A, the two cells can cool 55,000 gal. of water per hour to 78°F. and in circuit B, 50,000 gal. per hour to 72°F., both at a wet bulb temperature of 64°F. Even if one cell in each tower is temporarily out of commission, the throughput can be maintained but at a slightly reduced efficiency.

The works water cooling plant centrifugal water pumps are provided for the various water circulation duties. In circuit A, a 55,000-gal. per hour pump delivers water from the cold well of the cooling tower to the items of plant using the cooling water, from which it is returned partly by gravity and partly by pump pressure. In circuit B, there is a similar pump carrying out the same operation and the third pump is standby. In circuit B, however, it is necessary to collect the water from the wash oil and crude benzole coolers and from the secondary cooler heat exchanger in a hot well, after first ensuring that any contaminating oil has been decanted off. From this hot well, a 45,000 gal. per hour pump delivers it back to the cooling tower. A pump of similar capacity is provided as a standby.

Water Treatment

In addition to the boilers and the turbo alternator, water treatment and evaporator plants have been installed at the works generating station. Raw water from the sand feeder on the site is treated in a fully automatic John Thompson-Kennicott lime precipitation water treatment plant and filter battery. With a capacity of 16,000 lb. of water per hour, it supplies some 100,000 lb. of water per hour as make-up water to the cooling circulation system, just described, as well as further quantities to other services at the coking plant as they are needed. The remainder, to be used as boiler feed water, passes through a base exchange unit, equipped with a polystyrene head resin bed and on to the 'fully treated' water storage tank.

Duplicate, triple effect, evaporator units supplied by Aiton & Co. Ltd., and each with a capacity of 25,000 lb. per hour, produce distilled water from the fully treated water for steam raising. They are designed to operate initially on live steam at 160 p.s.i. and 470°F. but ultimately at 600 p.s.i. and 800°F. Such a provision allows steam for the evaporators to be taken from the turbine pass-out and so load it more heavily during the period of low steam consumption in the works in the early days of the coking plant,

There are three stoker-fired boilers, supplied by Clarke Chapman & Co. Ltd., each with a steam raising capacity of 20,000 lb. per hour at 615 p.s.i. and 815°F. They are of the Bi-Drum type and will fire coke oven gas at times of low gas demand in addition to the South Hetton smalls burned on the chain grates. Fuel blending equipment allows a mixture of this coal with breeze to be burned. Boiler operation is controlled manually from unit control boards and the supply of feed water is regulated by Copes Flomatic tension type regulator equipment. There are three multistage centrifugal feed water pumps, each with a capacity of 40,000 lb. of water per hour at 212°F. and at a pressure of 725 p.s.i. Two are electrically driven and the third turbine driven. Each is fitted with mechanically operated leak-off valves, combined with non-return valves, which will pass up to 7,200 lb. of water per hour.

Power Generating

The turbo-alternator set is a W. H. Allen five-stage impulse, back pressure turbine driving a Mather and Platt alternator through a double helical epicylic gear box. It consumes 33,000 lb. of steam per hour at 600 p.s.i. and 800°F. and exhausts to the low pressure main at 160 p.s.i. and 475°F. Under these conditions, which will ultimately be the normal loading from the coking plant, the set generates 860 kW at 3.3 kV, 3 phase and 50 cycles. Duplicate pressure reducing and attemporating equipment, capable of manual or automatic control, has been installed in parallel with the turbo-alternator to take over the steam supply should the alternator fail, or during periods of maintenance. A second set of pressure reducing and attemporating equipment, down stream of the turbo-alternator, provides steam to the purifier boxes and the small quantities of low pressure steam used at the pit head buildings.

Electrical Supply

Incoming electrical supplies at 66 kV from the North Eastern Electricity Board are successively transformed to 3.3 kV and two duplicate feeds at this voltage to the coking plant, come into the generating station. This allows the locally generated power to be run in tandem with either feed. From this 3.3 kV circuit, through two 250-kVA transformers a supply is made available at 550 V for the station auxiliaries and a further 75-kVA transformer converts the latter to 415 V to give 230 V to neutral for lighting. A tertiary winding on this transformer provides a 110-V circuit for power supplies to socket outlets. In addition a NiFe battery provides a D.C. circuit for closing the 3.3-kV switchgear, D.C. tripping throughout the station and emergency lighting for at least three hours in the event of an electrical failure.

It is rather more than two years ago that the author commented in these columns on the Ministry of Agriculture's experiments with gas liquor on grassland and kale, in comparison with equivalent applications of sulphate of ammonia. These experiments were carried out by the National Agricultural Advisory Service in various parts of the country at a large number of different centres and included one small-scale duration test on the author's farm at Ropley, Hampshire, with the co-operation of an officer of the N.A.A.S.

By F. CLIFTON SHERRIFF

Gas liquor triumphs in fertiliser trials

IN summarising the results of these tests one drew the conclusion that, save on kale, sulphate of ammonia was generally more effective than gas liquor at equivalent nitrogen rates. This took no account, of course, of cost or of the several ancillary advantages of the liquid dressing, such as weed and pest control and the long-term benefit accruing from an alkaline as distinct from an acid dressing.

Nevertheless, the findings were disappointing to the gas industry; and it is not surprising that attempts have since been made to explain them by blaming the quality of the liquor used and the means of application. In his paper to the Eastern Juniors ('GAS JOURNAL,' November 13, 1957) Mr. W. W. Law suggested that varying types and qualities of liquors must have been used in experiments conducted in so many widely separated areas. In such circumstances consistent results could hardly be expected. Furthermore, there was deterioration of the liquor when conveyed to the trial sites in metal drums or when stored therein for any length of time. I am also firmly of the opinion that it is impossible to simulate commercial practice and thus get results equal to commercial applications on small trial plots using a garden watering-can instead of a properly designed spreader.

In consultation, therefore, with the N.A.A.S. Grasslands Advisory Officer, Mr. W. G. Gwynne, we decided to run a further series of experiments on this farm—but this time making the plots big enough to permit the dressings to be applied under ordinary working conditions and using normal commercial appliances.

Two fields were selected each approximately six acres in extent, and these were divided into nine trial plots averaging two-thirds of an acre. Field No. 1 consisted of a ley of Cockle Park type in its third year, while Field No. 2 was a similar ley in its second year. Apart from their ages, the two leys differed in one other respect; the grasses in No. 2 were largely commercial strains, while those in No. 1 were predominantly pedigree. There was a noticeably better bottom growth in No. 1.

Prior to the commencement of the experiments both fields had a dressing in October, 1958, of 2 cwt. per acre of a 0-10-20 compound—that is to say, one containing no nitrogenous element. The autumn application of gas liquor was on November 11 and the sulphate of ammonia on November 13. The spring dressings were on March 6 and February 26 respectively. The weather was normal for the time of year during all the applications. Sampling was carried out by Mr. Gwynne on May 29 with the following results:

Treatment	Weight in lb. dry matter per 25 sq. yards			
	Field 1 (1)	Field 2 (2)	Average (3)	(4)
A. Autumn G/L	8·05	6·76	7·40	164
B. ,, S/A	6·40	4·92	5·66	124
C. Control (no dressings)	4·78	4·13	4·55	100
D. Autumn G/L and Spring S/A ..	7·74	10·28	9·01	190
E. ,, S/A ,, ,, S/A ..	9·64	8·90	9·27	204
F. Spring S/A	7·40	7·78	7·59	167
G. Autumn G/L and Spring G/L ..	8·29	8·65	8·47	186
H. ,, S/A ,, ,, G/L ..	8·33	9·39	8·86	195
J. Spring G/L	11·98	9·38	10·68	235

NOTE.—Taking Control as 100, column (4) represents the relative values of the mean of the two plots.

The application rates in each case were 3 cwt. per acre of sulphate of ammonia and 400 gal. per acre of gas liquor, which represents approximately the same amount of nitrogen on the basis of 20% S/A and 10 oz. strength G/L.

Triumphantly ahead

It will be seen that in these plots we have every possible permutation of the two fertilisers and the two periods of application. While some of the variations may be regarded as of academic interest only, since it is unlikely that such combinations of fertilisers or times of application would be adopted in normal practice, nevertheless some striking figures emerge.

First, it appears that on this particular type of land at any rate—that is, light calcarious soil of no great depth above the chalk—spring-applied gas liquor stands out triumphantly ahead of all other variations. Indeed, it is 14% better than its nearest rival, which is the double (autumn and spring) application of sulphate of ammonia. While autumn-applied liquor is substantially better (24%) than sulphate put down at the same time, it is nothing like so effective as the spring liquor, which suggests a fair degree of leaching on this land—assisted, no

doubt, by the excessively wet state of the ground after last year's deplorable summer.

It is notable that spring liquor is 29% better than sulphate applied at the same time. In fact, spring sulphate comes out just about the same as autumn liquor. Autumn sulphate on these figures would be regarded by most farmers as a 'dead loss.' The double application of liquor shows up remarkably poorly in comparison with the single one—probably due to the double scorching of the foliage. It will be observed that autumn-applied liquor followed by spring sulphate produced extraordinarily good results in No. 2 field, showing, in fact, a clear 'top' for this field. I cannot offer any explanation for this except that the particular plot happens to be in a slight hollow.

Superiority of gas liquor

In conclusion, it is doubtful if finality will ever be reached on this question of fertilisers, since results depend upon so many variables—chief of which, of course, are the weather and the type of soil. For this reason, the foregoing results must not be taken as disproving those that have gone before in other areas and on other soils. It is reasonable to assume, however, that they confirm the superiority of gas liquor over sulphate of ammonia when applied in the spring on this kind of land—and by a very substantial margin. It also appears that there is something like a 30% loss in the effectiveness of autumn-applied liquor as compared with the spring dressing. The loss with sulphate is about 26%—which suggests that the effect of leaching is very much the same whether the fertiliser is solid or liquid.

Jointing Plastic Pipes

THE Victaulic joint, which is widely known and used for the jointing of steel tubes and cast iron pipes, is also suitable for the jointing of plastic pipes.

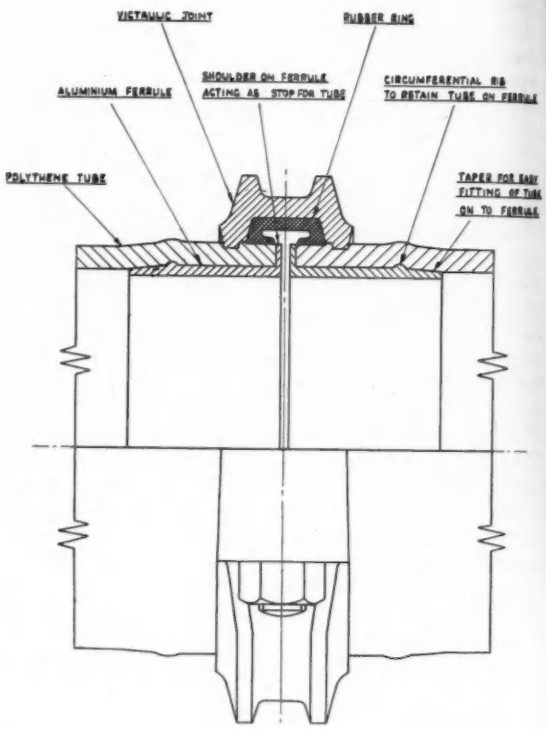
The illustration shows how simple is its design, which consists of a composition of self-sealing ring and metal housings which embrace the two pipe ends firmly. The housing accurately centralises the self-sealing ring and keeps it firmly in position to maintain leak tightness. It is suitable for fluids and gases under pressure or vacuum.

When used for joining steel tubes, the pipes are either grooved or shouldered, leaving the metal housing to accommodate the end load.

When used for joining flexible polythene pipes, the Victaulic joint can be adapted by the provision of metal or plastic inserts which slip into the pipe ends, thereby maintaining roundness. There is no need to groove the pipe, since it is sufficiently pliable for each Victaulic joint to press its own grooves.

The joint is assembled in the normal way, and the application of the bolt load is sufficient to deform the plastic tube to the exact shape of the joint gland, the resistance to deformation being accommodated by the strength of the plastic pipes or metal insert, which is designed for this purpose.

Extensive research at the Victaulic Company's works on joints up to 6 in. dia. has been begun recently, and it has been established that polythene pipes jointed in this manner can be be pressurised until they burst, without separation. During tests, and at varying pressures, assemblies weighing several hundredweights have been dropped and otherwise manhandled without affecting leaktightness.


VICTAULIC JOINT
RUBBER RING
ALUMINIUM FERRULE
SHOULDER ON FERRULE ACTING AS STOP FOR TUBE
CIRCUMFERENTIAL RIB TO RETAIN TUBE ON FERRULE
POLYTHENE TUBE
TAPER FOR EASY FITTING OF TUBE ON TO FERRULE

Due to the nature of the material used in the manufacture of semi-rigid and rigid plastic pipes, the Victaulic joint will not deform this type of tubing when bolting up. Grooves, therefore, can be cut into the ends of the pipes in a similar manner and with the same equipment as that employed for the preparation of steel tube ends. Here again, research has been carried out, and tests undertaken for various tube manufacturers. It is regarded by all concerned that the Victaulic joint is eminently satisfactory for this purpose and preserves the flexibility normally associated with this product, which is necessary for tubes of a rigid nature.